No. 736,846. PATENTED AUG. 18, 1903.

W. E. HAMILTON.

LOADING MACHINE.

APPLICATION FILED OCT. 25, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

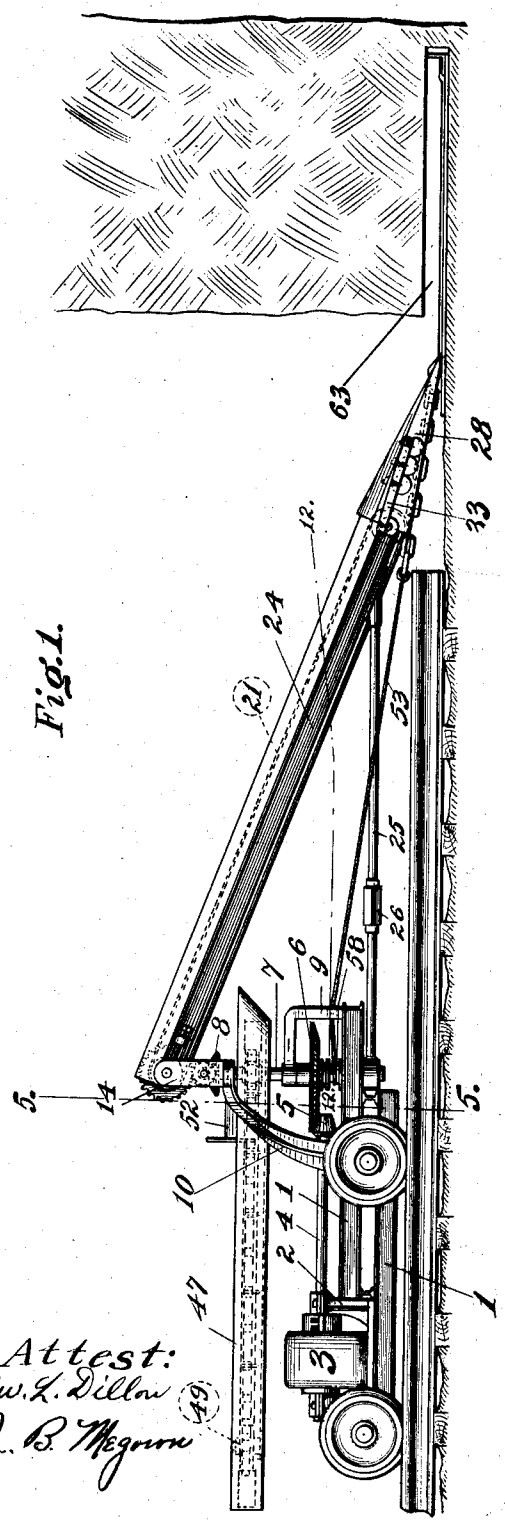


Fig. 1.

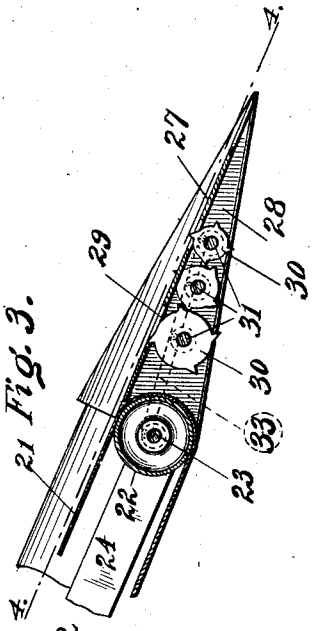


Fig. 3.

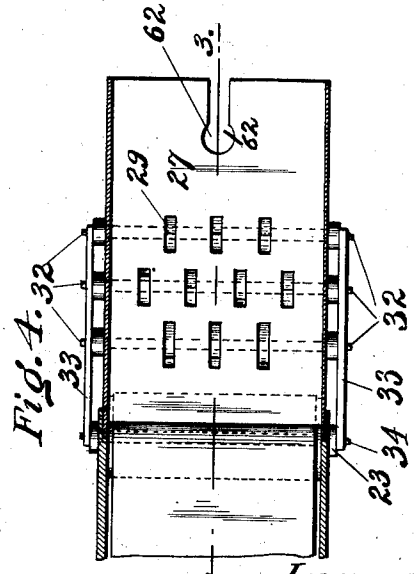


Fig. 4.

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NO MODEL. 5 SHEETS—SHEET 2.

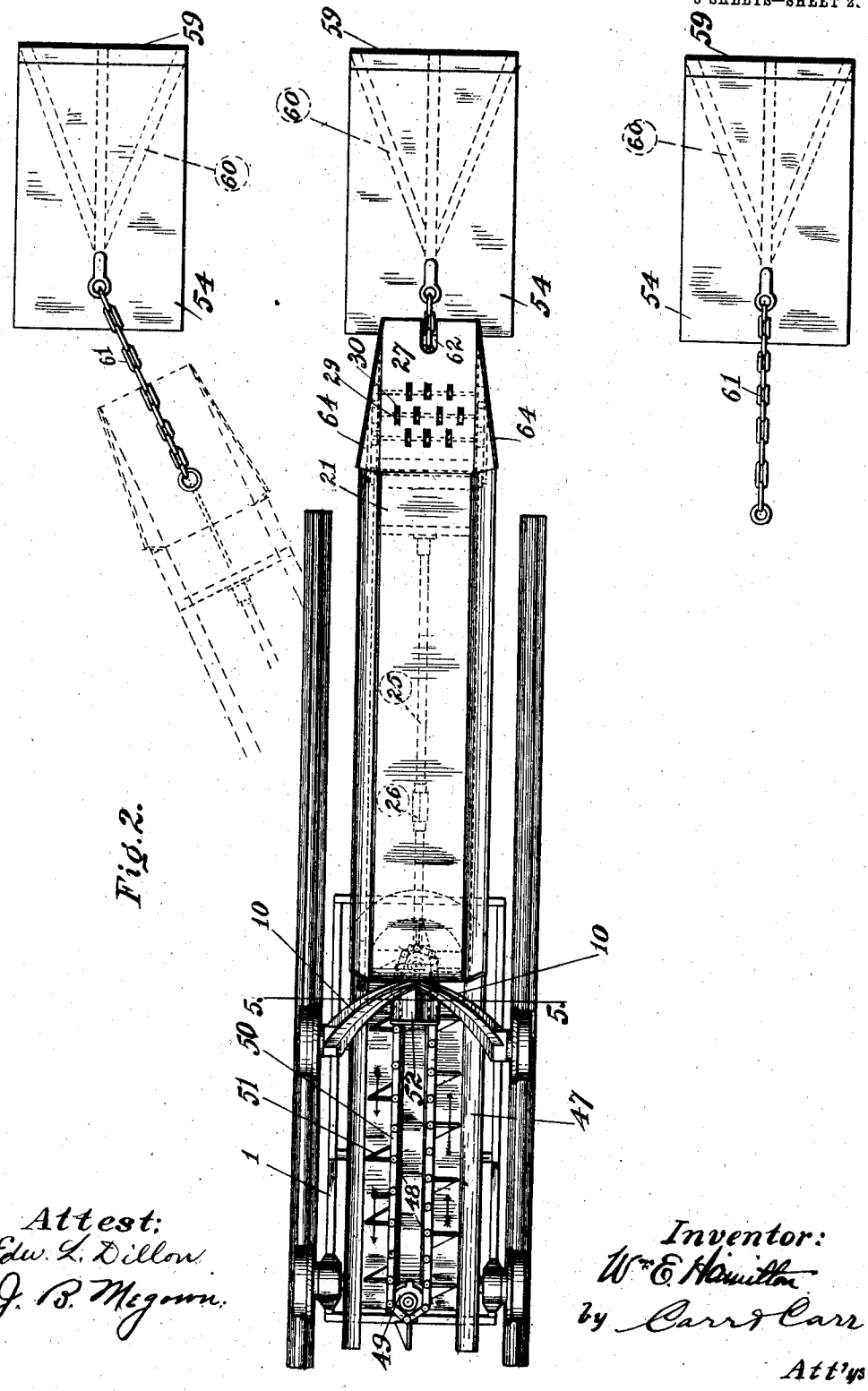


Fig. 2.

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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 5.

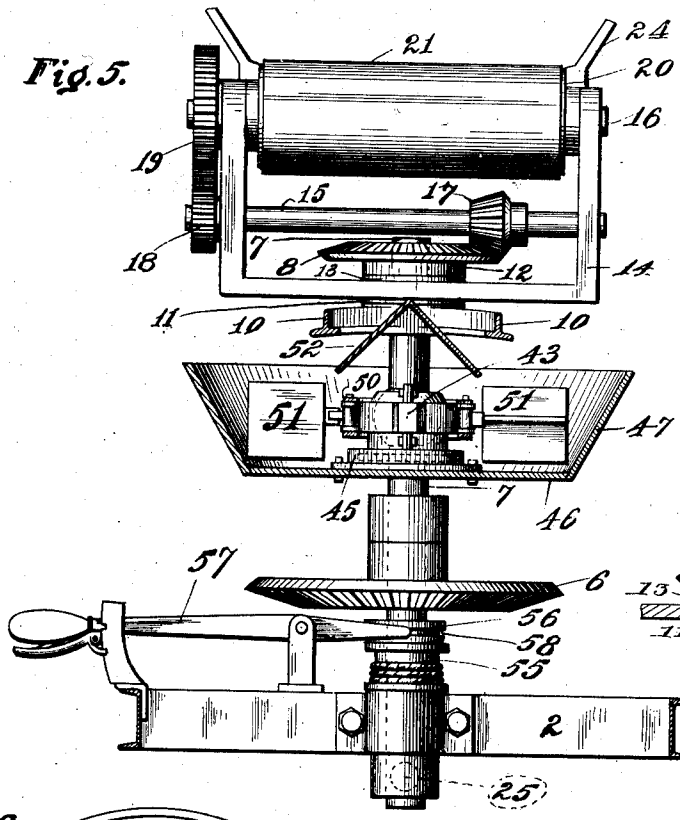


Fig. 13.

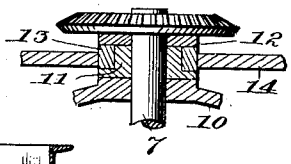


Fig. 6.

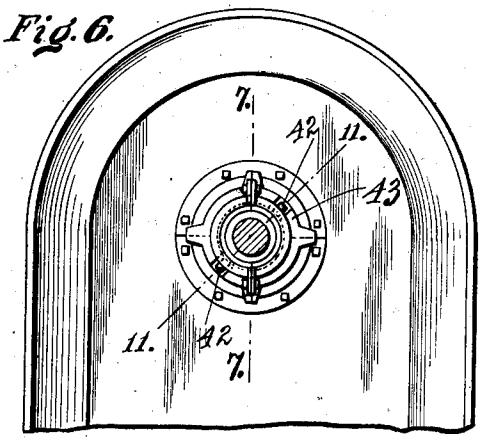


Fig. 7.

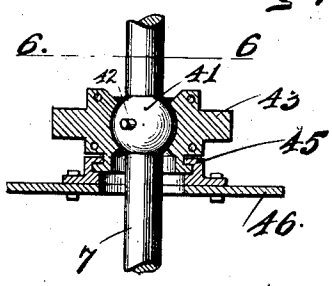
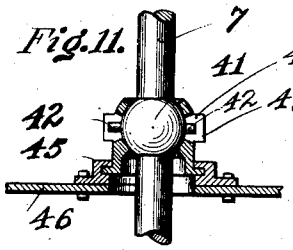


Fig. 11.



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NO MODEL. 5 SHEETS—SHEET 4.

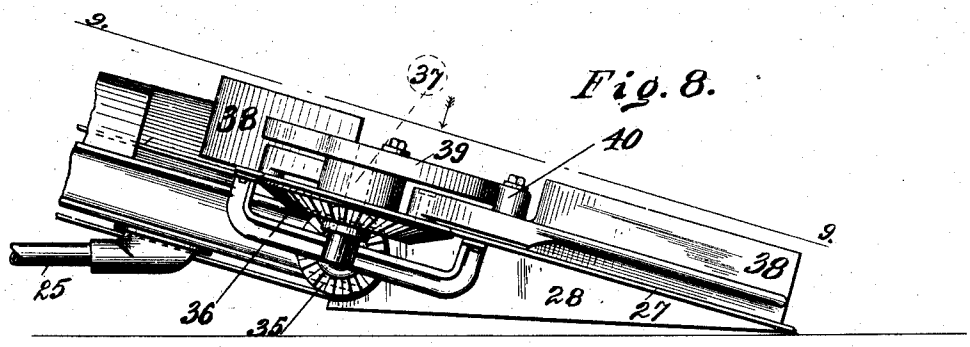
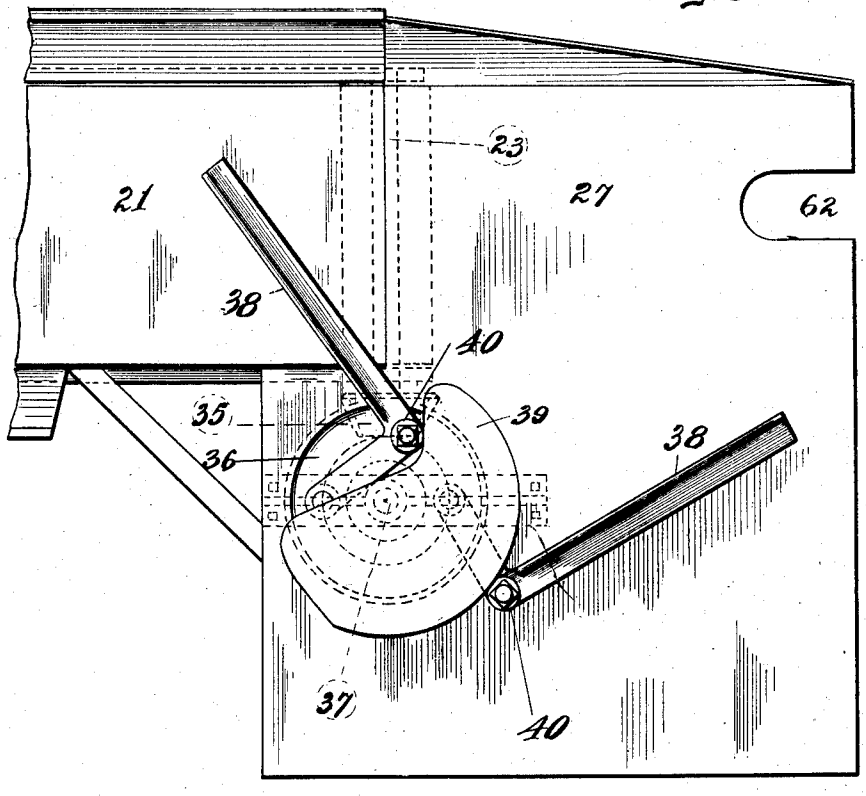


Fig. 8.

Fig. 9.



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NO MODEL. 5 SHEETS—SHEET 5.

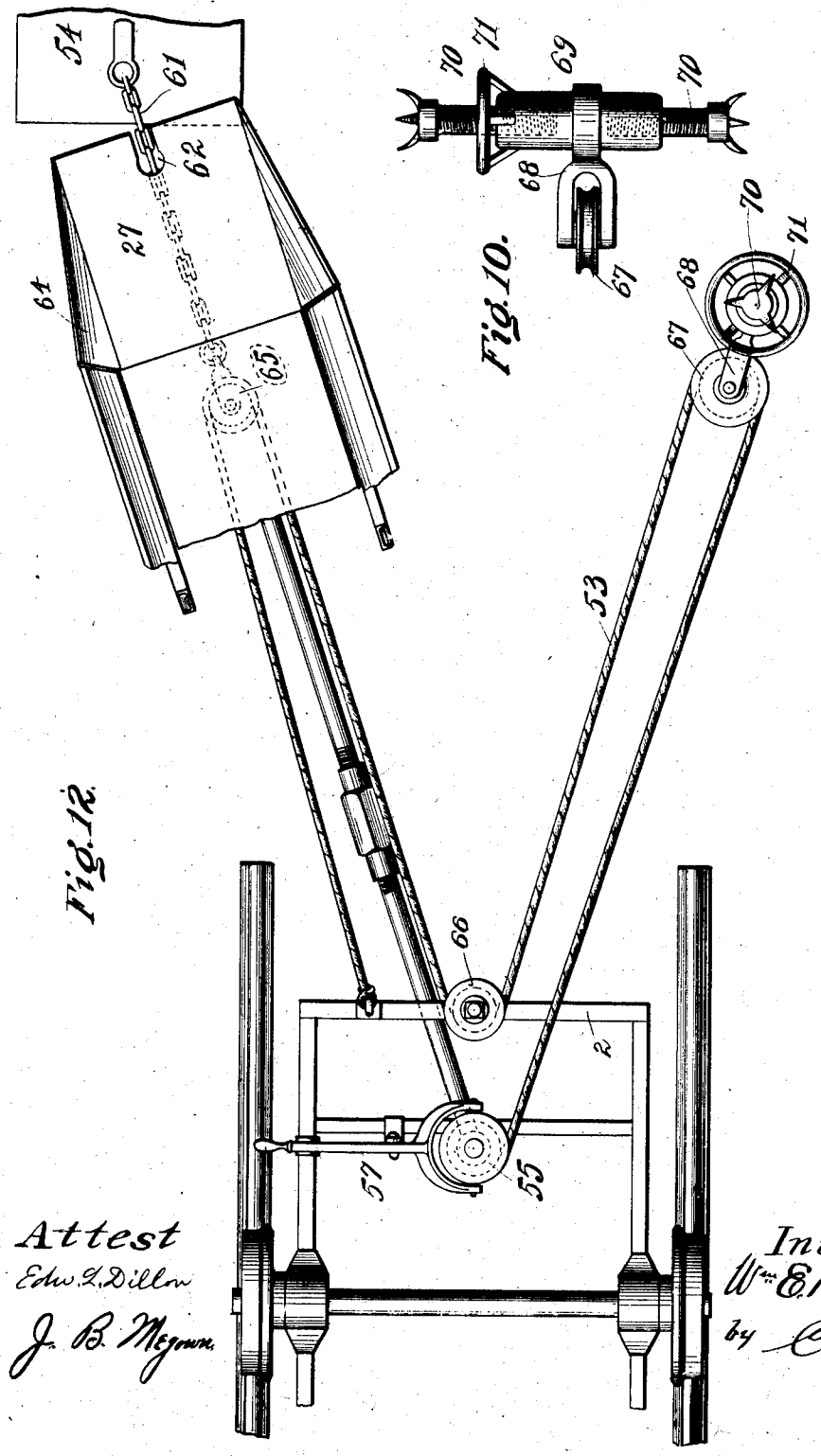


Fig. 12.

Fig. 10.

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No. 736,846. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM E. HAMILTON, OF ZANESVILLE, OHIO.

LOADING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 736,846, dated August 18, 1903.

Application filed October 25, 1902. Serial No. 128,736. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HAMILTON, a citizen of the United States, and a resident of the city of Zanesville, county of Muskingum and State of Ohio, have invented certain new and useful Improvements in Loading-Machines, of which the following is a specification.

My invention relates to a system of handling coal in mine-chambers, and has for its principal object to utilize the slot made by the undercutting mining-machine as a space for inserting plates for anchoring the loading-machine and coöperating therewith, as hereinafter described; also, to provide for forcing the end portion of the gathering mechanism into the coal, and thereby bringing the coal within the range of the conveyer mechanism; also, to provide an initial gathering device for feeding coal to the conveyer; also, to provide against strains tending to tip or turn the loading-machine or to make it leave its track, and to improve the construction and secure other advantages hereinafter disclosed.

My invention consists principally in equipping the end of the conveyer-frame with an inclined plate adapted to be forced along the surface of the anchor-plates, and thereby raise the coal within range of the conveyer.

It also consists in equipping said inclined plane with devices for mechanically forcing the coal upwardly along its surface and onto the conveyer.

It also consists in a delivery-conveyer mounted to have a limited universal movement, as hereinafter described and claimed.

It also consists in the parts and the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side view of my loading-machine connected to an anchor-plate located in the slot formed by the mining-machine. It is to be understood, however, in practical use the coal will be shot down before the loading-machine is attached to the drag-plates. Fig. 2 is a plan view of my machine. Fig. 3 is a vertical longitudinal sectional detail of the gathering device at the end of the conveyer-frame on the line 3 3 of Fig. 4. Fig. 4 is a horizontal sectional detail view thereof on the line 4 4 of Fig. 3. Fig. 5 is a vertical cross-section of my machine on the line 5 5 of Fig. 1 looking to the right, on an enlarged scale. Fig. 6 is a horizontal sectional detail on the line 6 6 of Fig. 7. Fig. 7 is a vertical sectional detail on the line 7 7 of Fig. 6, illustrating the universal joint. Fig. 8 is an elevation, and Fig. 9 is a plan view, of a modified form of initial gathering device at the end of the conveyer-frame. Fig. 10 is an elevation of an anchor-column. Fig. 11 is a vertical sectional detail of the universal joint on the line 11 11, Fig. 6. Fig. 12 is a view illustrating the systematic arrangement of the machine and the drag-plates and anchor-column. Fig. 13 is a detail view of the swivel-mounting of the yoke.

My machine is preferably mounted on a wheeled truck or platform 1 to facilitate its movement and is sufficiently low built to operate in the chambers of an ordinary coal-mine. The frame 2 of the machine rests upon the movable platform and itself supports the motor or engine, preferably an electric motor 3. The main shaft 4 of the motor is preferably horizontal and is provided with a bevel-gear 5, which meshes with another bevel-gear 6, fixed on a vertical shaft 7, which shaft 7 carries at its upper end a bevel-gear 8, which transmits power to the gathering mechanism. This shaft 7 is journaled in bearings supported by yoke 9 and arms 10, mounted on the framework of the machine. The uppermost supporting-arms 10 carry a sleeve 11, through which the vertical shaft extends, and upon the uppermost end of said sleeve a collar 12, fixed to said shaft, rests flatwise, whereby said shaft is supported in proper position. A cylindrical shell 13 fits around the sleeve 11 so as to swivel thereon, and this shell rests upon a shoulder formed on said sleeve 11. This cylindrical shell 13 constitutes, in effect, a hub or axle for a yoke 14, which has a circular opening in its loop portion to fit over said hub or axle 13 and rotate thereon. This yoke 14 carries two horizontal shafts 15 and 16, on one of which, 15, is a bevel-gear 17, which meshes with the bevel-gear 8 on the upper end of the vertical shaft 7 and carries a gear 18, which meshes with a gear 19 on the other shaft 16, supported in said yoke. This last-mentioned shaft 16 has a drum 20 mounted thereon, over which passes

an endless conveyer-belt 21. This belt also passes over a second drum 22, mounted on a shaft 23, journaled in the outer end portion of an elongated frame 24, which is pivotally mounted on the shaft 16 of the first-mentioned drum 20. By reason of the elongated frame 24 of the gathering mechanism being pivotally supported on the horizontal shaft 16 of the drum 20 it is enabled to swing vertically, and by reason of said drum-shaft being carried on the pivotally-mounted yoke 14 said elongated frame is enabled to swing horizontally. The outer end of the elongated frame 24 is unsupported except for a strut or distance-piece 25, which extends from the frame of the machine to near the end of the elongated frame of the gathering-mechanism frame. This strut 25 is pivotally mounted concentric with its vertical shaft 7 and is preferably made in two parts, screw-threaded and connected by an ordinary turnbuckle 26, whereby the length of the strut may be altered and the elevation of the outer end of the elongated frame raised accordingly. The outer end of the elongated frame is provided with a supplemental or initial gathering device designed to feed the material to the main belt or conveyer 21. For this purpose the outer end of the elongated frame has journaled thereon a frame which is designed to operate as a wedge or inclined plane. This frame consists, preferably, of a flat plate 27, with triangular or wedge-shaped sides 28 extending downwardly therefrom and with the point of the wedge outermost. In practice the sides of this platform rest upon the floor of the mine-chamber, whereby the surface of the plate is inclined upwardly. When the machine moves forwardly, the plate operates as a wedge or inclined plane and is driven into the mass of loose coal far enough to bring the main conveyer within operating distance thereof. In order to supplement this merely wedging action, the frame is preferably provided with mechanical means for forcing the coal backwardly to the main conveyer. Such means are shown in Figs. 3, 4, 8, and 9 of the drawings. In the construction shown in Figs. 3 and 4 the inclined plate is provided with longitudinal slots 29, and through the slots project upwardly the teeth of a number of wheels 30, mounted on shafts 31, journaled in the sides of the frame. These shafts are provided with crank-arms or wrist-pins 32 and are connected by pitman-rods 33 to a pitman 34, mounted on the outermost shaft of the conveyer-belt. By this arrangement the wheels are driven by the conveyer mechanism, and their teeth tend to force upwardly onto the conveyer-belt any lumps of coal that are in position to be reached by said teeth. In the construction shown in Figs. 8 and 9 the foremost shaft 23 of the conveyer mechanism is provided with a bevel-gear 35, which meshes with a bevel-gear 36, loosely journaled on a shaft 37, fixed in the inclined plate or wedge. A number of flights or sweep-vanes 38 are pivotally mounted on the face of this last-mentioned bevel-gear 36. A stationary cam-shaped disk 39 is fixed on the stationary shaft 37 in position to coöperate with said vanes 38, so that when the vanes sweep over the end portion of the conveyer-belt their motion is retarded in order not to scrape off of the belt any of the coal delivered thereto. In order to give the flights a digging action as they sweep across the surface of the wedge-plate, they are made angular in shape, so that the body of the flight bears against the coal at an angle instead of flatwise. Preferably the flight is provided with an antifriction-roller, 40 arranged to bear against the edge of the cam-disk 39.

Upon the vertical driving-shaft 7 is a spherical enlargement or hub 41, located below the upper or delivery end of the gathering mechanism. This spherical enlargement or hub 41 has a plurality of pins 42, projecting radially therefrom and perpendicular to the shaft. Surrounding this spherical hub 41 is a sprocket-wheel 43, made in two parts to permit it to fit over the spherical hub on the shaft. The middle portion of the hub of the sprocket-wheel is hollowed out spherically to conform to the spherical hub 41 of the shaft and is provided with a series of holes 44 for the pins to engage. These holes are larger than the pins, so as to permit a limited universal movement of the sprocket-wheel relative to the shaft, whereby the delivery-trough 46, which is secured to said sprocket-wheel, as hereinafter described, is adapted to have its delivery end free to move to any desired position.

The under side of the sprocket-wheel 43 has a circumferential groove, in which fits a circular collar or flange 45, fixed to the bottom of the delivery-trough 46. This delivery-trough consists of a metal bottom plate with side guard-plates 47, arranged to stiffen the same, and thereby constitute a strut, a distance piece or pieces 48, extending from the shaft of one sprocket-wheel to the shaft of the other sprocket-wheel, serving to further stiffen the trough and also serving as a guide or lateral support for the chain. The outer end of said trough is free and carries a sprocket-wheel 49, over which, as well as over the above-mentioned sprocket-wheel 43, the delivery sprocket-chain 50 passes. This sprocket-chain is of any suitable type that is provided with flights 51 for forcing the material along the trough. In order to protect the operating mechanism at the end of the delivery-trough from the coal falling from the gathering-conveyer, inclined deflector-plates 52 are mounted on the frame of the trough.

In the practical use of my machine I contemplate forcing the wedge-shaped initial feeder under the mass of loose coal. For this purpose the machine is provided with a winding mechanism adapted to wind up and pull upon a rope or chain 53, and drag-plates or anchor-plates 54 are provided for fastening said rope or chain, and thereby insuring the

movement of the machine toward the anchor-plates or the anchor-plates toward the machine. Any suitable winding mechanism may be employed for this purpose. As shown in the drawings, the winding mechanism comprises a winding-drum 55, loosely mounted on the vertical driving-shaft 7, and a friction-clutch 56, keyed to said shaft, but movable endwise thereof and having a conical or tapering end arranged to jam into a conical opening provided therefor in said drum 55, whereby said drum is shifted into and out of engagement with said shaft. The clutch 56 is shifted by means of a hand-lever 57, provided with a pin which engages a circumferential groove 58 in the clutch.

The anchor-plates or drag-plates consist of flat plates of metal of suitable length to reach back to the end of the cut or slot formed by the mining-machine in the body of the coal. Each plate has one end 59 turned up or flanged and is preferably stiffened with ribs or bars on its under side. Each anchor-plate is provided with means, such as a chain 61, for securing the winding rope or chain of the machine thereto. As shown, such chain is fastened to one of the stiffening-bars and is of sufficient length to be accessible when the coal is shot down on the anchor-plate. The inclined platform has a slot or opening 62 therein for the chain to pass through. In practical operation the anchor-plates are inserted into the slots or cut 63, formed by the mining-machine, with their flanged ends innermost. Then the coal is shot down thereon and the loading-machine brought in and its chain fastened to one of the anchor-plates and the winding mechanism set in operation. As the chain is wound up the pull on the chain tends to draw the machine and the anchor-plates closer together. If the plate is firmly anchored, it remains stationary and the machine is pulled toward it, in which case the inclined plate or wedge-shaped frame is forced along the upper surface of the anchor-plate under the mass of coal, whereby the coal is wedged up in position for the conveyer-belt to reach it. If the anchor-plate is not firmly anchored, it yields and its end flange forces forwardly a considerable portion of the coal, which is forced upwardly along the inclined platform and is delivered onto the conveyer-belt. In each case there is a relative motion of the machine and the anchor-plate, whose result is the delivery of the coal, and in each case the anchor-plate forms a smooth floor for the wedge-shaped frame 27 to work along. The frame 27 is provided with upwardly-extending side guards 64, which prevent the coal from falling off.

It is noted that when the machine is connected to an anchor-plate 54 out of line with the track or tramway there is a tendency to tip the machine. This tendency can be minimized by a tension-equalizing device, such as that shown in Fig. 12. This device consists of a series of pulleys for the rope 53, so arranged that the resultant direction of the forces is approximately in line with the track. For this purpose the rope 53 is fastened to the front of the truck or main frame and passes thence forwardly and around a pulley 65, whose yoke is connected to the drag-chain 62 of the anchor-plate. From this pulley 65 the rope passes backwardly and around a second pulley 66, which is fixed on the truck or main frame, and thence said rope passes around a third pulley 67, whose yoke 68 is swiveled on an anchor-column provided for the purpose. From this last-mentioned pulley 67 the rope passes to the winding-drum 55.

The anchor-column consists of a bar or column 69, having its ends internally screw-threaded in opposite directions, after the manner of a turnbuckle. In each of such ends works a threaded bar 70, whose end is provided with prongs or grappling-fingers. The body or middle portion 69 of the column is equipped with a hand-ring 71 for manipulating the same. In operation the column is set up on the side of the track opposite the side at which the scoop is intended to operate, and its position is such that the angle which the rope over it makes with the middle line of the track is about equal to the angle which the rope on the scoop side makes with the track when the scoop is about midway of its working position. The force of the pull on the drag-plate may be affected or not, according to the arrangement of the track; but the resultant direction of the force acting upon the truck is in the line of its track.

Obviously the construction hereinbefore described admits of considerable modification without departing from my invention, and I do not wish to be restricted to the exact construction hereinbefore described.

What I claim is—

1. A low-built loading-machine comprising a main frame, actuating mechanism, and a conveyer operatively connected thereto, the frame of said conveyer being pivotally mounted on the forward end of the main frame to swing horizontally and having provision on its outer end for delivering material to the conveyer.

2. A low-built loading-machine comprising a main frame, actuating mechanism, and a conveyer operatively connected thereto, said conveyer having an elongated frame mounted on the main frame to swing horizontally and having its outer end project beyond said main frame and provided with an inclined plate at its outer end arranged to be wedged into the material, substantially as and for the purpose set forth.

3. A loading-machine comprising a main frame, actuating mechanism, and a conveyer operatively connected thereto to be actuated thereby, said conveyer having an elongated frame mounted on the main frame to swing horizontally and vertically and projecting beyond said main frame, and a gathering device mounted on the projecting end of said con-

veyer-frame and arranged to gather the material and deliver the same to said conveyer.

4. A loading-machine comprising a main frame, actuating mechanism, a conveyer operatively connected thereto to be actuated thereby, said conveyer having an elongated frame mounted on the main frame to swing horizontally and vertically and projecting beyond said main frame, and a gathering device arranged on the projecting end of said conveyer-frame, said gathering device comprising an inclined plate arranged to be wedged into the material and means actuated by the conveyer mechanism for forcing the material upwardly along the surface of said plate and onto the conveyer.

5. A loading device comprising actuating mechanism, a conveyer mechanism operatively connected thereto to be actuated thereby, and a gathering device mounted on the outer end of the frame of said conveyer, said gathering device comprising an inclined plate arranged to be wedged into the material, a shaft arranged perpendicular to the plane of said plate and arranged to be actuated by the conveyer mechanism, and vanes on said shaft arranged to sweep above said plate and thereby force the material onto the conveyer.

6. In a loading-machine a movable main frame and a gathering mechanism pivotally mounted thereon, said gathering mechanism comprising an elongated frame and a conveyer thereon to swing horizontally and vertically, and an initial gathering device located at the end of said frame and arranged to gather the material and feed it to the conveyer.

7. A loading-machine comprising a movable main frame, a gathering mechanism pivotally mounted thereon, and a strut pivotally mounted on said main frame to turn with said gathering mechanism, said strut being connected to the free end of the frame of said gathering mechanism.

8. A loading-machine comprising a movable main frame, a gathering mechanism pivotally mounted thereon and an extensible strut pivotally mounted on said main frame to turn with said gathering mechanism, said strut being connected to the free end of said gathering mechanism.

9. A loading-machine comprising a movable main frame, a gathering mechanism pivotally mounted thereon, and a strut pivotally mounted on said main frame concentric with the gathering mechanism and connected to the free end of the frame of said gathering mechanism.

10. In a system of loading coal in mine-chambers, flanged anchor-plates adapted to be inserted into the slot cut by the mining-machine before the coal is shot down, substantially as and for the purpose set forth.

11. In a system of loading coal in mine-chambers, a flanged anchor-plate adapted to be inserted into the slot cut by the mining-machine before the coal is shot down, said anchor-plate having a drag-chain, substantially as and for the purpose set forth.

12. A system of loading coal in mine-chambers comprising a conveyer mechanism and actuating mechanism therefor and plates adapted to be inserted into the slots cut by the mining-machine before the coal is shot down, said conveyer having its end inclined, substantially as and for the purpose set forth.

13. A system of loading coal in mine-chambers comprising a conveyer mechanism and actuating mechanism therefor and flanged anchor-plates adapted to be inserted into the slots cut by the mining-machine before the coal is shot down, said conveyer having its end inclined and the anchor-plates being adapted for connection to the actuating mechanism, substantially as and for the purposes set forth.

14. The combination with a loading-machine comprising a movable frame and a conveyer pivotally mounted thereon and having at the free end of its frame an inclined plate adapted to be wedged into the material, of an anchor-plate adapted to be inserted into the slot cut by the mining-machine before the coal is shot down, and an anchor-column, and a rope connected to a winding mechanism on the main frame and passing around pulleys provided therefor on the anchor-column and the main frame and operatively connected to said anchor-plate.

15. The combination with a loading-machine comprising a movable frame and a conveyer pivotally mounted thereon and having at the free end of its frame an inclined plate adapted to be wedged into the material, of an anchor-plate having a drag-chain and adapted to be inserted into the slot cut by the mining-machine before the coal is shot down, and an anchor-column, and a rope connected to winding mechanism on the main frame and passing around pulleys provided therefor on the anchor-column and the main frame and operatively connected to the drag-chain of said anchor-plate.

16. The combination with a loading-machine comprising a movable frame having a winding mechanism thereon, a conveyer pivotally mounted on said main frame and having at the free end of its frame an inclined plate adapted to be wedged into the material, and a strut pivotally mounted on the main frame and connected to the free end of said conveyer-frame, of a flanged anchor-plate adapted for coöperation with the winding-rope, and an extensible anchor-column adapted to secure a firm purchase endwise in the walls of the mine-chamber, and pulleys on said column and on the main frame, and a rope extending from the winding-drum around said pulleys and operatively connected to said drag-chain.

17. The combination with a loading-machine comprising a movable frame having a winding mechanism thereon, a conveyer piv-

otally mounted on said main frame and having at the free end of its frame an inclined plate adapted to be wedged into the material, and an extensible strut pivotally mounted on the main frame and connected to the free end of said conveyer-frame, of a flanged anchor-plate adapted for coöperation with the winding-rope, and an extensible anchor-column adapted to secure a firm purchase endwise in the walls of the mine-chamber, and pulleys on said column and on the main frame, and a rope extending from the winding-drum around said pulleys and operatively connected with said drag-chain.

18. The combination with a loading-machine comprising a movable frame having a winding mechanism thereon, a conveyer pivotally mounted on said main frame and having at the free end of its frame an inclined plate adapted to be wedged into the material, and a strut pivotally mounted on the main frame concentric with said conveyer, and connected to the free end of said conveyer-frame, of a flanged anchor-plate adapted for coöperation with the winding-rope, and an extensible anchor-column adapted to secure a firm purchase endwise in the walls of the mine-chamber, and pulleys on said column and on the main frame and a rope extending from the winding-drum around said pulleys and operatively connected to said drag-chain.

19. The combination with an upright driving-shaft having a spherical enlargement and pins projecting radially from said enlargement, and a conveyer mechanism comprising a sprocket-wheel fitting over said enlargement and having holes coöperating with said pins, and a frame having a second sprocket-wheel at its outer end, and a conveyer-chain having flights thereon arranged to push the material along the conveyer-channel.

20. A loading-machine comprising actuating mechanism and a conveyer operatively connected thereto, the outer end of the conveyer-frame having provision for delivering material to said conveyer, and a second conveyer arranged below the delivery end of said first-mentioned conveyer, said second conveyer being mounted on a driving-shaft of the actuating mechanism so as to have a limited universal movement thereon.

21. A loading-machine comprising actuating mechanism and a conveyer operatively connected thereto, the outer end of the conveyer-frame having provision for delivering material to said conveyer, and a second conveyer arranged below the delivery end of said first-mentioned conveyer, said second conveyer being mounted upon an upright driving-shaft of the actuating mechanism and the normal position of its conveyer-chain being in a horizontal plane and said chain having plates thereon arranged to push the material along the conveyer-channel.

WILLIAM E. HAMILTON.

Witnesses:
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